UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
OSB2001-0138-FEC

December 17, 2001

Mr. Lawrence C. Evans
Portland District, Corps of Engineers
CENWP-OP-GP (Monical)
P.O. Box 2946
Portland, Oregon 97208-2946

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Act Essential Fish Habitat Consultation, East Mooring Basin Maintenance Dredging Project, Lower Columbia River Basin, Clatsop County, Oregon (Corps No. 2001-00333)

Dear Mr. Evans:

Enclosed is a biological opinion (Opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of the proposed East Mooring Basin Maintenance Dredging Project in Clatsop County, Oregon. In this Opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of twelve ESA listed salmonids, or destroy or adversely modify their designated critical habitat. As required by section 7 of the ESA, NMFS included reasonable and prudent measures with nondiscretionary terms and conditions that NMFS believes are necessary to minimize the impact of incidental take associated with this action.

This Opinion also serves as consultation on Essential Fish Habitat pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations at 50 CFR Part 600.

Please direct any questions regarding this consultation to Rob Markle of my staff in the Oregon Habitat Branch at 503.230.5419.

Sincerely,

Michael R Crouse

P.r

D. Robert Lohn
Regional Administrator

cc: USFWS (K. Larson/ J. Buck)

Endangered Species Act
Section 7 Consultation
and
Magnuson-Stevens Act
Essential Fish Habitat Consultation

BIOLOGICAL OPINION

East Mooring Basin Maintenance Dredging Project,
Lower Columbia River Basin, Clatsop County, Oregon (Corps No. 2001-00333)

Agency: U.S. Army Corps of Engineers, Portland District

Consultation Conducted by: National Marine Fisheries Service,
Northwest Region

Date Issued: December 17, 2001

Issued by: Michael R Crouse
for D. Robert Lohn
Regional Administrator

Refer to: OSB2001-0138-FEC

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1. ENDANGERED SPECIES ACT

1.1 Background

On July 9, 2001, the National Marine Fisheries Service (NMFS) received a letter from the U.S. Army Corps of Engineers (Corps) requesting formal consultation pursuant to the Endangered Species Act (ESA) for the issuance of a permit under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act to the Port of Astoria (Port) to allow maintenance dredging of the East Mooring Basin on the Columbia River, Clatsop County, Oregon. NMFS responded on August 23, 2001, that consultation could not be completed until additional information was provided, including sediment test results. On November 30, 2001, the NMFS received a letter from the Corps revising the proposed action and providing the requested information. NMFS considered the information sufficient to initiate consultation. The Corps determined the proposed action was likely to adversely affect the following ESA listed species: Snake River steelhead (*Oncorhynchus mykiss*), Upper Columbia River steelhead, Middle Columbia River steelhead, Upper Willamette River steelhead, Lower Columbia River steelhead, Snake River spring/summer chinook salmon (*O. tshawytscha*), Snake River fall chinook salmon, Upper Columbia River spring-run chinook salmon, Upper Willamette River chinook salmon, Lower Columbia River chinook salmon, Columbia River chum salmon (*O. keta*), and Snake River sockeye salmon (*O. nerka*).

The purpose of the proposed project is to maintain adequate water depth in the East Mooring Basin to allow continued use by commercial fishing and recreational vessels. The basin has only been dredged once since construction. The Port dredged to provide access to the boat ramp in November 1994. The Mooring Basin is on the Columbia River at approximately river-mile 16 at the foot of 36th Street in Astoria.

This biological opinion (Opinion) considers the potential effects of the proposed action on Snake River steelhead, Upper Columbia River steelhead, Middle Columbia River steelhead, Upper Willamette River steelhead, Lower Columbia River steelhead, Snake River spring/summer chinook salmon, Snake River fall chinook salmon, Upper Columbia River spring-run chinook salmon, Upper Willamette River chinook salmon, Lower Columbia River chinook salmon, Columbia River chum salmon, and Snake River sockeye salmon. The subject action will occur within designated critical habitat for these species. Species information references, listing dates, critical habitat designations, and take prohibitions are listed in Table 1. The objective of this Opinion is to determine whether the proposed action is likely to jeopardize the continued existence of the ESA listed species, or destroy or adversely modify designated critical habitat for this species. This consultation is conducted pursuant to section 7(a)(2) of the ESA and its implementing regulations, 50 CFR 402.

1.2 Proposed Action

The proposed action is issuance of a permit by the Corps under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act for maintenance dredging at river-mile 16 of the Columbia River. The Port (permit applicant) proposes to dredge four of the five dredge material management units (DMMUs) within the East Mooring Basin (40 acres). An approximately 32-acre area will be dredged to a depth ranging from -20 to -5 feet MLLW using an hydraulic-pipeline dredge. The current depth within the mooring basin ranges from -20 to -2 feet MLLW. A maximum of 148,000 cubic yards (cy) of material is proposed for dredging from the mooring basin over a five year period (68,000 cy during the 2001/2002 in-water work period and up to 20,000 cy annually until February 2006). Dredged material is proposed for flow-lane disposal at approximately river-mile 15.5 of the Columbia River by either pipeline or barge transport. A disposal pipeline will discharge dredge material at a depth of greater than 50 feet, and 5 feet above the river bottom during ebb tides. The Corps does not know how far the turbidity plume will extend.

Sediment testing was conducted within the entire mooring basin in July 2001. With the exception of DMMU-A, test results indicated that dredged materials were suitable for unconfined in-water disposal as determined by the Dredge Material Management Team (DMMT). Results from DMMU-A exhibited elevated concentrations of DDT. In October 2001, a more intensive sediment sampling effort was completed in DMMU-A (8 acres) to better identify the degree and extent of DDT contamination within the unit. One of the four sub-units exceeded the Dredge Material Evaluation Framework (DMEF) screening level of 6.9 parts per billion (ppb). Due to continued concern by Federal and state agencies regarding the suitability of material dredged from the unit for in-water disposal, the Port withdrew DMMU-A from the proposed action and will establish a setback in adjacent units to reduce the potential for the material in DMMU-A from sloughing.

The proposed action will require approximately 18 days to complete in 2001/2002, and 5 days in each subsequent year. All in-water work is proposed to occur during the Oregon Department of Fish and Wildlife (ODFW) recommended in-water work window, November 1 to February 28 (ODFW 2000). A barge will be used in association with this action.

The Corps has not indicated the proposed action includes any change to the Mooring Basin's moorage capacity. Therefore, the evaluation of the effects of in-water structures has not been conducted in this consultation.

1.3 Biological Information and Critical Habitat

Based on migratory timing, listed salmon or steelhead species likely will be present in the action area during the proposed dredging operations. The proposed action would occur within designated critical habitat for the listed salmon species.

An action area is defined by NMFS regulations (50 CFR Part 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing fish passage, hydraulics, sediment and pollutant discharge, and the extent of riparian habitat modifications. Indirect effects may occur throughout the river where actions described in this Opinion lead to additional activities or affect ecological functions contributing to habitat degradation.

For this project, NMFS defines the action area as the affected substrate, bank, and aquatic areas of the Columbia River at the 32 acre project site, and a distance not to exceed 3 miles downstream of river-mile 15.5 due to dredged material disposal. The action area serves predominately as a migration corridor for both adult and juvenile salmonids. Peak juvenile migration periods are May through June for steelhead, sockeye salmon, coho salmon (*O. kisutch*), and age-1 (spring/summer) chinook salmon juveniles, and June through July for age-0 (fall) chinook juveniles. The peak chum salmon fry outmigration occurs from March through May. Juvenile salmonids may reside in the Columbia River estuary year round, but most species spend no more than a few months in the estuary before emigrating to the ocean to mature. Fall chinook salmon are more dependent on the estuary than other species. Returning adults migrate over a wide range of times depending on species and stock of origin. Steelhead, chum salmon and coho salmon are the primary adult salmonids likely to be present during the proposed in-water work period (November 1 to February 28). Coho salmon are currently a candidate species for ESA listing. For specific species information, refer to the literature cited in Table 1.

Juveniles of salmonid species such as spring chinook, sockeye, and coho salmon and steelhead usually move down river relatively quickly and in the main channel. This aids in predator avoidance (Gray and Rondorf 1986). Fall and summer chinook salmon are found in nearshore, littoral habitats and are particularly vulnerable to predation (Gray and Rondorf 1986). Juvenile salmonids (chinook and coho salmon) use backwater areas during their outmigration (Parente and Smith 1981).

Essential features of the adult and juvenile migratory corridor for the species are: (1) Substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food (primarily juvenile), (8) riparian vegetation, (9) space, and (10) safe passage conditions. The essential features this proposed project may affect are substrate, water quality, food, and safe passage conditions resulting from dredging and dredge disposal activities.

1.4 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). In conducting analyses of habitat-altering actions under section 7 of the ESA, NMFS uses the following steps: (1) Consider the status and biological requirements of the species; (2) evaluate the relevance of the environmental baseline

in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; (4) consider cumulative effects; and (5) determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival in the wild or adversely modify its critical habitat. In completing this step of the analysis, NMFS determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the continued existence of the listed species or result in destruction, adversely modify their critical habitat, or both. If NMFS finds that the action is likely to jeopardize the listed species, NMFS must identify reasonable and prudent alternatives for the action.

1.4.1 Biological Requirements

The first step in the methods NMFS uses for applying the ESA to listed species is to define the biological requirements of the species most relevant to each consultation. NMFS also considers the current status of the listed species taking into account population size, trends, distribution and genetic diversity. To assess the current status of the listed species, NMFS starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that are relevant to the determination.

The relevant biological requirements are those necessary for the listed species to survive and recover to naturally reproducing population levels at which protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stocks, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment.

The biological requirements that are relevant to this consultation are adequate water quality, increased migration and spawning survival and improved habitat characteristics (including food availability and quality, and substrate composition) that function to support successful migration and rearing. The current status of the affected listed species, based upon their risk of extinction, has not significantly improved since these species were listed and, in some cases, their status may have worsened due to continuing downward trends toward extinction (see Table 1 for references).

1.4.2 Environmental Baseline

The environmental baseline is a review of the effects of past and ongoing human and natural factors leading to the current status of the species or its habitat and ecosystem within the action area.

The Columbia River below Bonneville Dam has been substantially altered due to diking of lowlands for flood prevention and agriculture, increased inputs of sewage and storm water run-off from cities, shoreline modification to prevent erosion, installation of docks and marinas, installation of berthing facilities and wharves for shipping, and dredging for vessel navigation.

These alterations have modified water quality, altered rearing and spawning habitat, and decreased migration survival. The biological requirements of the listed species are not being met under the environmental baseline. Their status is such that there must be a significant improvement in the environmental conditions they experience, including the condition of designated critical habitat, over those currently available under the environmental baseline.

In addition to the subject consultation, the NMFS is aware of two dredging actions proposed in the area that will dispose of dredged material in the lower Columbia River. The East End Boat Basin Breakwater Repair Project, Phase-3, will dispose of approximately 45,000 cubic yards of material at river mile 15. The West Mooring Basin Breakwater Replacement Project proposes to dispose of 19,000 cubic yards of material at river mile 13.

1.5 Analysis of Effects

1.5.1 Effects of Proposed Actions

Dredging

Dredging and disposal of dredged material speed up the natural processes of sediment erosion, transportation and deposition (Morton 1977). The physical effects to the river system from dredging and disposal briefly summarized are: Temporary increases in turbidity, changes in bottom topography with resultant changes in water circulation, and changes in the mechanical properties of the sediment at the dredge and disposal sites (Nightingale and Simenstad 2001, Hershman 1999, Morton 1977). The significance of the effect is a function of the ratio of the size of the dredged area to the size of the bottom area and water volume (Morton 1977).

Potential effects to listed salmonids from the proposed action include both direct and indirect effects. Potential direct effects include entrainment of juvenile fish (Nightingale and Simenstad 2001, Armstrong *et al.* 1982, Tutty 1976, Dutta and Sookachoff 1975a, Boyd 1975) and mortality from exposure to suspended sediments (turbidity) (Nightingale and Simenstad 2001). Potential indirect effects include behavioral and sub-lethal affects from exposure to increased turbidity (Nightingale and Simenstad 2001, Emmett *et al.* 1988, Gregory 1988, Servizi 1988, Sigler 1988, Kirn *et al.* 1986, Berg and Northcote 1985, Sigler *et al*. 1984, Whitman *et al*. 1982); mortality from predatory species associated with dredged material disposal (Nightingale and Simenstad 2001); mortality resulting from stranding as a result of vessel wakes; modifications to nearshore habitat resulting from erosion as a result of vessel wakes or dredging itself (Nightingale and Simenstad 2001); loss of benthic food sources resulting from dredging and disposal of dredged material (Nightingale and Simenstad 2001, Morton 1977); and cumulative effects of increased industrialization at port facilities located along the river.

The proposed hydraulic suction dredging may entrain juvenile salmonids. When juvenile salmonids come within the "zone of influence" of the cutter head, they may be drawn into the suction pipe (Dutta 1976, Dutta and Sookachoff 1975a). Dutta (1976) reported that salmon fry were entrained by suction dredging in the Fraser River and recommended that suction dredging

during juvenile migration be controlled. Almost 99% of entrained juveniles were killed in studies by Braun (1974a, 1974b). Suction dredging operations caused "a partial destruction of the anadromous salmon fishery resource of the Fraser River" (Dutta and Sookachoff 1975b). Suction pipeline dredges operating in the Fraser River during fry migration took substantial numbers of juveniles (Boyd 1975). As a result of these studies, the Canadian government issued dredging guidelines for the Fraser River to minimize the potential for entrainment (Boyd 1975). Further testing in 1980 by Arseneault (1981) found entrainment of chum and pink salmon but in low numbers relative to the total of salmonids outmigrating (0.0001 to 0.0099%).

The Corps' Portland District conducted extensive sampling within the Columbia River in 1985-88 (Larson and Moehl 1990) and again in 1997 and 1998. In the 1985-88 study no juvenile salmon were entrained, and in the 1997-98 study only two juvenile salmon were entrained. Examination of fish entrainment rates in Grays Harbor from 1978 to 1989 detected only one juvenile salmon entrained (McGraw and Armstrong 1990). Dredging was conducted outside peak migration times. No evidence of fish mortality was found while monitoring dredging activities along the Atlantic Intracoastal Waterway (Stickney 1973).

These Fraser and Columbia River studies examined deep-water areas associated with main channels. There is little information on the extent of entrainment in shallow water areas, such as those associated with the proposed action. Further information is needed to determine if suction dredging in these shallow water areas may entrain juvenile salmonids.

In areas of coarse sand, NMFS expects the amount of turbidity generated from the dredging process to be very small and confined to the area close to the cutterhead. In areas of fine and medium-grained sediments, turbidity and resuspension of toxic sediments during dredging and disposal may be a problem. The sediment test results from the July 2001 sample event in the mooring basin indicate a high percentage of silt/clay in the composite samples for DMMU-B, C, and D (74.6% to 78.5%). The silt/clay percentage for DMMU-E was considerably less (60.3%). NMFS assumes considerable turbidity may result from the proposed dredging and in water disposal.

Suspended sediment and turbidity influences on fish reported in the literature range from beneficial to detrimental. Elevated total suspended solids (TSS) conditions have been reported to enhance cover conditions, reduce piscivorous fish/bird predation rates, and improve survival. Elevated TSS conditions have also been reported to cause physiological stress, reduce growth, and reduce survival. Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure (not just the TSS concentration).

Behavioral avoidance of turbid waters may be one of the most important effects of elevated suspended sediments (DeVore *et al*. 1980, Birtwell *et al*. 1984, Scannell 1988). Salmonids have been observed to move laterally and downstream to avoid turbid plumes (McLeay *et al*. 1984, 1987, Sigler *et al*. 1984, Lloyd 1987, Scannell 1988, Servizi and Martens 1991). Juvenile salmonids tend to avoid streams that are chronically turbid, such as glacial streams or those

disturbed by human activities, except when the fish must traverse these streams along migration routes (Lloyd *et al*. 1987). In addition, a potential positive effect is providing refuge and cover from predation (Gregory and Levings 1998).

Fish that remain in turbid, or elevated TSS, waters experience a reduction in predation from piscivorous fish and birds (Gregory and Levings 1998). In habitats with intense predation pressure, this provides a beneficial trade-off (e.g., enhanced survival) to the cost of potential physical effects (e.g., reduced growth). Turbidity levels of about 23 Nephalometric Turbidity Units (NTU) have been found to minimize bird and fish predation risks (Gregory 1993). Exposure duration is a critical determinant of the occurrence and magnitude of physical or behavioral effects (Newcombe and MacDonald 1991). Salmonids have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with floods, and are adapted to such high pulse exposures. Adult and larger juvenile salmonids appear to be little affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjorn and Reiser 1991). However, chronic exposure can cause physiological stress that can increase maintenance energy and reduce feeding and growth (Redding *et al*. 1987, Lloyd 1987, Servizi and Martens 1991).

Turbidity, at moderate levels, has the potential to reduce primary and secondary productivity, and at high levels, has the potential to injure and kill adult and juvenile fish, and may also interfere with feeding (Spence *et al.* 1996, Bjornn and Reiser 1991). Other behavioral effects on fish, such as gill flaring and feeding changes, have been observed in response to pulses of suspended sediment (Berg and Northcote 1985). Fine redeposited sediments also have the potential to reduce primary and secondary productivity (Spence *et al.* 1996), and to reduce incubation success (Bell 1991) and cover for juvenile salmonids (Bjornn and Reiser 1991).

Issues involving turbidity associated with flow-lane disposal were addressed in previous biological opinions with the Corps for navigation channel maintenance dredging (NMFS 1993, NMFS 1999). NMFS did not believe that mortality resulting from turbidity was an issue of concern during those consultations and has no information that would change that belief for this Opinion. While further study is warranted on shallow water habitat dredging, current information suggests the size of the proposed action will limit any turbidity effects to a low level of incidence at the dredge site. The proposed timing (November 1 to February 28) and methodology restraints (hydraulic dredging and ebbtide disposal) should minimize turbidity exposure to at-risk juvenile salmonids. The NMFS expects adult salmonids (e.g., steelhead, chum salmon, and coho salmon) to avoid the turbidity plume.

The sediment test results suggest that the material to be dredged from the East Mooring Basin does not exceed current DMEF contaminant screening levels and is suitable for in-water disposal. Regardless of the DMMT determination, the NMFS has ongoing concerns about the potential effects of sediment contaminants, particularly sublethal and cumulative effects. Direct and indirect adverse effects may be exhibited at very low concentrations for some contaminants (Brewer *et al*. 2001, Moore and Waring 2001, Beauvais *et al*. 2000, Johnson 2000, Scholz *et al*.

2000, NMFS 1998, Waring and Moore 1997, Zuranko *et al*. 1997, Moore and Waring 1996, Meador 1991). Sediment test results submitted by the Corps for the proposed action indicate elevated concentrations of polycyclic aromatic hydrocarbon (PAH) in DMMU-C and DMMU-D. While contaminate concentrations were potentially sufficient to elicit adverse affects on resident flatfish species, concentrations did not exceed the threshold levels that NMFS considers harmful to salmonids or their prey organisms.[1]

Dredged material disposed of in the flow lane will not collect at the point of discharge, but will be transported in the lower water column and be distributed over a large area. Eventually, the majority of dredged material is expected to be transported out to sea by river currents and natural bedload transport. Therefore, the effects of flow-lane disposal may extend well downstream. Any adverse effects presumably will diminish the further downstream the material is transported and dispersed. The deposition of some dredged material is likely in low current areas of the river and may remain in the riverine system for extended periods.

Periodic removal of accumulated sediments via dredging may convert intertidal habitats to subtidal, or shallow subtidal habitats to deeper subtidal. Such conversions risk affecting plant and animal assemblages uniquely adapted to the particular site conditions these habitats offer. The Columbia River Basin's shallow water habitat has been greatly reduced by diking, filling, dredging, flooding (dams), and urban development activities during the last century. The reduction has substantially affected the prey base and off-channel rearing areas for juvenile salmonids and other fish species. Fall chinook salmon and chum salmon fry are known to use shallow water habitat during their estuarine residency. Chum salmon fry, in particular, prefer vegetated water depths of approximately 1.5 to 3 feet (Nightingale and Simenstad 2001). A pre- and post-dredging survey of an Everett, Washington, marina found higher catches of fish before dredging (Nightingale and Simenstad 2001). Catches of individuals and species declined from 89.8 fish per tow to 2.7 fish per tow and from eight species to five species. Regarding further loss of this important habitat type, Nightingale and Simenstad (2001) state, "The loss of vegetated shallow-water, nearshore habitat, given the important rearing and refugia functions such habitats provide for migrating juvenile salmon and other important fishes, would represent landscape capacity loss as well as potential disruption and reduction in landscape connectivity." Though the proposed action will increase marina depth, the depth range within the marina will not be appreciably altered. The current depth range is -3 to -20 feet, and dredging will increase the minimum to -5 feet and not dredge below current maximum (-20 feet).

The dredging and dredged material disposal activity associated with the proposed action may result in direct effects on listed species. These effects will likely be minimal due to the relative low abundance of listed salmonids in the project area during the proposed action and the expanse

[1] Telephone conversation with Lyndal Johnson, NMFS' Northwest Fisheries Science Center, with Rob Markle, NMFS, Oregon Habitat Branch, discussing a review of the sediment test results for the East Mooring Basin Maintenance Dredging Project (November 9, 2001).

of the channel. Furthermore, flow-lane disposal at a depth of greater than 50 feet during ebb tides is expected to reduce water column effects.

Construction Equipment

As with all construction activities, accidental release of fuel, oil, and other contaminants may occur. Operation of the dredge equipment requires the use of fuel, lubricants, etc., which if spilled into a water body or the adjacent riparian zone could injure or kill aquatic organisms. Petroleum-based contaminants (such as fuel, oil, and some hydraulic fluids) contain PAHs which can cause acute toxicity to salmonids at high levels of exposure and can also cause chronic lethal as well as acute and chronic sublethal effects to aquatic organisms (Neff 1985).

1.5.2 Effects on Critical Habitat

The NMFS designates critical habitat based on physical and biological features that are essential to the listed species. Essential features of designated critical habitat include substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage. Effects to critical habitat from these categories are included in the effects description expressed above in section 1.5.1, *Effects of Proposed Action*.

1.5.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as those effects of "future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action Cumulative effects are defined in 50 CFR 402.02 as those effects of "future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes. Therefore, these actions are not considered cumulative to the proposed action.

NMFS is not aware of any specific future non-federal activities within the action area that would cause greater effects to listed species than presently occur. NMFS assumes that future private and state actions will continue at similar intensities as in recent years. As the human population in the state continues to grow, demand for actions similar to the subject project likely will continue to increase as well. Each subsequent action by itself may have only a small incremental effect, but taken together they may have a significant effect that would further degrade the watershed's environmental baseline and undermine the improvements in habitat conditions necessary for listed species to survive and recover.

1.6 Conclusion

After reviewing the current status of the listed species, the environmental baseline for the action area, the effects of the proposed dredging and disposal, and cumulative effects, NMFS has determined that the East Mooring Basin Maintenance Dredging Project, as proposed, is not likely to jeopardize the continued existence of Snake River steelhead, Upper Columbia River steelhead, Middle Columbia River steelhead, Upper Willamette River steelhead, Lower Columbia River steelhead, Snake River spring/summer chinook salmon, Snake River fall chinook salmon, Upper Columbia River spring-run chinook salmon, Upper Willamette River chinook salmon, Lower Columbia River chinook salmon, Columbia River chum salmon, or Snake River sockeye salmon, and is not likely to destroy or adversely modify designated critical habitat for these Evolutionarily Significant Units (ESUs). This finding is based, in part, on incorporation of best management practices (BMPs) into the proposed project design (e.g., ODFW in-water work window, flow-lane disposal at depth, and establishing a setback around DMMU-A), but also on the following considerations: 1) Testing indicates sediment contaminates are below known harmful thresholds, and dredging and in-water disposal will not pose an undue risk of exposure; 2) dredging will occur when listed species are present in relatively low numbers and the risk of entrainment is reduced; 3) dredging will increase the minimum marina depth by only 2 vertical feet (from -3 feet to -5 feet) and maintain the existing maximum depth of -20 feet; and 4) the period of dredged material disposal will occur when listed species are present in relatively low numbers and background turbidity levels already are elevated.

1.7 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitats, or to develop additional information. The NMFS believes the following conservation recommendations are consistent with these obligations, and therefore should be carried out by the Corps for lower Columbia River dredging activities conducted under Corps authorization:

1. As previously recommended (NMFS 1999, NMFS 2001), the Corps should analyze potential dredge entrainment of juvenile salmonids in shallow water areas maintained by the Corps, and send NMFS a copy of that analysis by January 2002.

2. The Corps should reassess the potential effects of contaminants, including sublethal effects and bioaccumulation, on fish and benthic prey species from in-water disposal of dredged materials.

3. The Corps should work to revise the DMEF to reflect the results of the effects reassessment in Conservation Recommendation #2 above.

4. As recommended by NMFS' Northwest Fisheries Science Center, the Corps should determine sediment concentrations rather than porewater concentrations when assessing contamination levels of butyltins.

5. The Corps should consider the use of technological tools as suggested by Nightingale and Simenstad (2001).

> Technological tools such as the "Silent Inspector" should be considered whenever particularly sensitive habitats or organisms are at risk due to dredging proximal to sensitive habitats or in projects where sediments both suitable and unsuitable for unconfined open water disposal will be dredged adjacent to each other. This computerized electronic sensor system can monitor pipeline dredging operations and assist in operational documentation and regulatory compliance by providing record accessibility and clarity. It also offers advantages for planning, estimating, and managing dredging activities.

This technology appears appropriate for dredging areas adjacent to DMMU-A.

6. The Corps should provide a constructed slope no steeper than 3:1 around DMMU-A to prevent sloughing of potentially contaminated sediments into dredged areas.

In order for the NMFS to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed salmon and their habitats, NMFS requests notification of any actions leading to the achievement of these conservation recommendations.

1.8 Reinitiation of Consultation

This concludes formal consultation on these actions in accordance with 50 CFR 402.14(b)(1). Reinitiation of consultation is required: (1) If the amount or extent of incidental take is exceeded; (2) the action is modified in a way that causes an effect on the listed species that was not previously considered in the biological assessment and this Opinion; (3) new information or project monitoring reveals effects of the action that may affect the listed species in a way not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

2. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered species and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, and sheltering (50 CFR 217.12). Incidental take is defined as take that is incidental to,

and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered to be a prohibited taking under the ESA provided that such taking is in compliance with the term and conditions of this incidental take statement.

2.1 Amount or Extent of Take

NMFS anticipates that the proposed action covered by this Opinion has more than a negligible likelihood of incidental take of listed species resulting from dredging and in-river disposal of dredged material. Effects of actions such as these are largely unquantifiable in the short term, but are expected to be largely limited to non-lethal take in the form of behavior modification. The effects of these activities on population levels are also largely unquantifiable and not expected to be measurable in the long term.

Therefore, even though NMFS expects some low level of non-lethal incidental take to occur due to the action covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NMFS to estimate a specific amount of incidental take to the species themselves. In instances such as this, NMFS designates the expected level of take in terms of the extent of take allowed. Therefore, NMFS limits the area of allowable incidental take during construction to that aquatic area within 100 feet of the Mooring Basin, and during dredge material disposal to a 3-mile reach of the Columbia River. Incidental take occurring beyond these areas is not authorized by this consultation. This incidental take statement terminates on February 28, 2006.

2.2 Reasonable and Prudent Measures

The NMFS believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of the above species.

1. Minimize the likelihood of incidental take associated with dredging and dredged material disposal by applying permit conditions to avoid or minimize disturbance to aquatic systems.

2. Ensure this biological opinion is meeting its objective of minimizing the likelihood of take from permitted activities by requiring comprehensive monitoring and reporting.

2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity.

1. To Implement Reasonable and Prudent Measure #1 (monitoring and reporting), the Corps shall ensure that:
    a. In-water work.
        i. All work shall take place during the recommended ODFW in-water work period (November 1 to February 28).
        ii. No in-water work shall take place outside the ODFW in-water work period without prior written authorization from the Corps (in consultation with NMFS).
    b. Pollution Control.
        i. A Pollution Control Plan (PCP) is developed to prevent point-source pollution related to construction operations that satisfies all pertinent requirements of Federal, state and local laws and regulations, and the requirements of these conservation measures.
        ii. An oil absorbing, floating boom shall be available on-site during all phases of construction.
    c. Hydraulic dredge operation.
        i. When using a hydraulic dredge, the dredge intake must be operated at or below the surface of the material being removed, but may be raised a maximum of 3 feet above the bed for brief periods of purging or flushing. At no time shall the dredge be operated at a level higher than 3 feet above the bed.
        ii. The discharge pipe shall be placed deeper than 20 feet below the surface during flow-lane disposal.
        iii. No dredging shall occur in areas containing emergent or submerged aquatic vegetation.

2. To Implement Reasonable and Prudent Measure #2 (monitoring and reporting), the Corps shall ensure that:
    a. Annually, within 30 days of completing the project for each year's dredging event, the applicant will submit a monitoring report to the Corps and NMFS describing the applicant's success meeting their permit conditions. This report will consist of the following information.
        i. Project identification.
            (1) Permit number;
            (2) applicant's name;
            (3) project name;
            (4) project location by 5th field hydrological unit code (HUC) and latitude and longitude;
            (5) starting and ending dates for work performed under the permit; and
            (6) the Corps contact person.
        ii. By DMMU, indicate the actual volume of dredged material removed and disposed, and the dates of disposal.

iii. A summary of the downstream extent and duration of any turbidity plume observed, and efforts made to control it.

iv. A copy of the pollution control inspection reports, a description of any accidental spills of hazardous materials, and efforts made to control accidental spills.

v. A copy of the supporting analysis of environmentally acceptable alternatives for management of the dredged material, if not previously provided.

b. The monitoring report shall be submitted to:

National Marine Fisheries Service
Habitat Conservation Division
Attn: OSB2001-0138-FEC
525 NE Oregon Street, Suite 500
Portland, OR 97232

c. If a dead, injured, or sick endangered or threatened species specimen is located, initial notification must be made to the National Marine Fisheries Service Law Enforcement Office, at the Vancouver Field Office, 600 Maritime, Suite 130, Vancouver, Washington 98661; phone: 360.418.4246. Care should be taken in handling sick or injured specimens to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered and threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed.

3. MAGNUSON-STEVENS ACT

3.1 Background

On July 9, 2001, the NMFS received a letter from the Corps requesting Essential Fish Habitat (EFH) consultation for the subject action pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and its implementing regulations (50 CFR 600). NMFS responded on August 23, 2001, that consultation could not be completed until additional information was provided, including sediment test results. NMFS considered the information provided on November 30, 2001, to be sufficient to initiate consultation on that date. The objective of the EFH consultation is to determine whether the proposed action may adversely affect designated EFH for relevant species, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.

3.2 Magnuson-Stevens Fishery Conservation and Management Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), requires the inclusion of EFH descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NMFS on activities that may adversely affect EFH.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of essential fish habitat: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110).

Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

- Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;
- NMFS shall provide conservation recommendations for any Federal or state activity that may adversely affect EFH;
- Federal agencies shall within 30 days after receiving conservation recommendations from NMFS provide a detailed response in writing to NMFS regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NMFS, the Federal agency shall explain its reasons for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of their locations.

3.3 Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon, and California. The designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (200 miles) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes,

ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (e.g., natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone offshore of Washington, Oregon, and California north of Point Conception to the Canadian border.

Detailed descriptions and identifications of EFH for the groundfish species are found in the Final Environmental Assessment/Regulatory Impact Review for Amendment 11 to The Pacific Coast Groundfish Management Plan (PFMC 1998a) and the NMFS Essential Fish Habitat for West Coast Groundfish Appendix (Casillas *et al.* 1998). Detailed descriptions and identifications of EFH for the coastal pelagic species are found in Amendment 8 to the Coastal Pelagic Species Fishery Management Plan (PFMC 1998b). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of the potential adverse effects to these species' EFH from the proposed action is based on this information.

3.4 Proposed Actions

The proposed action is detailed above in Section 1.2 of this document. The action area includes a 32-acre area at Astoria's East Mooring Basin and an estimated 3 mile reach of the Columbia River from river mile 12.5 to river mile 15.5. This area has been designated as EFH for various life stages of numerous groundfish, coastal pelagic fish, and salmon species (Table 2).

3.5 Effects of Proposed Action

As described in detail in Section 1.5 of this document, the proposed activities may result in short- and long-term adverse effects to a variety of habitat parameters. These impacts include:

Effect #1: Turbidity - Flow-lane disposal of dredge material will expose species present in the channel to elevated turbidity. An increase in turbidity can harm fish and filter-feeding macro-invertebrates.

Effect #2: Prey - Removal of sediments during dredging will similarly remove resident benthic invertebrates from the area dredged. In-water disposal of dredged material may bury benthic invertebrates causing short-term reductions in populations. Based on studies on the subject, recolonization is likely within a period of several months following the disturbance (Nightingale and Simenstad 2001, McCabe *et al*. 1998).

Effect #3: Shallow Water Habitat - Deepening vegetated aquatic areas may adversely affect fish use. Disturbance of shallow water areas may alter aquatic vegetation assemblages that provide import juvenile habitat for many designated EFH species.

Effect #4: Chemical Contamination - As with all construction activities, accidental release of fuel, oil, and other contaminants may occur.

3.6 Conclusion

NMFS believes that the proposed action may adversely affect the EFH for the groundfish, coastal pelagic, and Pacific salmon species listed in Table 2.

3.7 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the Magnuson-Stevens Act, NMFS is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. The conservation measures proposed for the project by the Corps, all conservation recommendations outlined above in Section 1.7 and all of the reasonable and prudent measures and the terms and conditions contained in Sections 2.2 and 2.3 are applicable to salmon EFH. Therefore, NMFS incorporates each of those measures here as EFH conservation recommendations.

3.8 Statutory Response Requirement

Please note that the Magnuson-Stevens Act (section 305(b)) and 50 CFR 600.920(j) requires the Federal agency to provide a written response to NMFS after receiving EFH conservation recommendations within 30 days of its receipt of this letter. This response must include a description of measures proposed by the agency to avoid, minimize, mitigate or offset the adverse impacts of the activity on EFH. If the response is inconsistent with a conservation recommendation from NMFS, the agency must explain its reasons for not following the recommendation.

3.9 Consultation Renewal

The Corps must reinitiate EFH consultation with NMFS if either action is substantially revised or new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600.920).

Table 1. References for additional background on listing status, biological information, protective regulations, and critical habitat elements for the ESA listed species present in the lower Columbia River.

Species	Listing Status	Critical Habitat	Protective Regulations	Biological Information, Historical Population Trends
Columbia River chum salmon	March 25, 1999; 64 FR 14508, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Johnson *et al.* 1997; Salo 1991
Lower Columbia River steelhead	March 19, 1998; 63 FR 13347, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Middle Columbia River steelhead	March 25, 1999; 64 FR 14517, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Upper Columbia River steelhead	August 18, 1997; 62 FR 43937, Endangered	February 16, 2000; 65 FR 7764	ESA section 9 take prohibition applies	Busby *et al.* 1995; 1996
Upper Willamette River steelhead	March 24, 1999 64 FR 14517, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Snake River Basin steelhead	August 18, 1997; 62 FR 43937, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Snake River sockeye salmon	November 20, 1991; 56 FR 58619, Endangered	December 28, 1993; 58 FR 68543	ESA section 9 take prohibition applies	Waples *et al.* 1991a; Burgner 1991
Lower Columbia River chinook salmon	March 24, 1999; 64 FR 14308, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Myers *et al.*1998; Healey 1991
Upper Columbia River spring-run chinook salmon	March 24, 1999; 64 FR 14308, Endangered	February 16, 2000; 65 FR 7764	ESA section 9 take prohibition applies	Myers *et al.*1998; Healey 1991
Upper Willamette River chinook salmon	March 24, 1999; 64 FR 14308, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Snake River spring/summer-run chinook salmon	April 22, 1992; 57 FR 14653, Threatened	December 28, 1993; 58 FR 68543	April 22, 1992; 57 FR 14653	Matthews and Waples 1991; Healey 1991
Snake River fall chinook salmon	April 22, 1992; 57 FR 14653, Threatened	December 28, 1993; 58 FR 68543	April 22, 1992; 57 FR 14653	Waples *et al.* 1991b; Healey 1991
Lower Columbia River/ Southwest WA coho salmon	July 25, 1995; 60 FR 38011, Candidate	Not applicable	Not applicable	Weitkamp *et al.* 1995

Table 2. Species with designated EFH found in waters of the State of Oregon.

Ground Fish Species	Blue rockfish (*S. mystinus*)	Rougheye rockfish (*S. aleutianus*)	Flathead sole (*Hippoglossoides elassodon*)
Leopard shark (*Triakis semifasciata*)	Bocaccio (*S. paucispinis*)	Sharpchin rockfish (*S. zacentrus*)	Pacific sanddab (*Citharichthys sordidus*)
Soupfin shark (*Galeorhinus zyopterus*)	Brown rockfish (*S. auriculatus*)	Shortbelly rockfish (*S. jordani*)	Petrale sole (*Eopsetta jordani*)
Spiny dogfish (*Squalus acanthias*)	Canary rockfish (*S. pinniger*)	Shortraker rockfish (*S. borealis*)	Rex sole (*Glyptocephalus zachirus*)
Big skate (*Raja binoculata*)	Chilipepper (*S. goodei*)	Silvergray rockfish (*S. brevispinus*)	Rock sole (*Lepidopsetta bilineata*)
California skate (*R. inornata*)	China rockfish (*S. nebulosus*)	Speckled rockfish (*S. ovalis*)	Sand sole (*Psettichthys melanostictus*)
Longnose skate (*R. rhina*)	Copper rockfish (*S. caurinus*)	Splitnose rockfish (*S. diploproa*)	Starry flounder (*Platyichthys stellatus*)
Ratfish (*Hydrolagus colliei*)	Darkblotched rockfish (*S. crameri*)	Stripetail rockfish (*S. saxicola*)	
Pacific rattail (*Coryphaenoides acrolepsis*)	Grass rockfish (*S. rastrelliger*)	Tiger rockfish (*S. nigrocinctus*)	**Coastal Pelagic Species**
Lingcod (*Ophiodon elongatus*)	Greenspotted rockfish (*S. chlorostictus*)	Vermillion rockfish (*S. miniatus*)	Northern anchovy (*Engraulis mordax*)
Cabezon (*Scorpaenichthys marmoratus*)	Greenstriped rockfish (*S. elongatus*)	Widow Rockfish (*S. entomelas*)	Pacific sardine (*Sardinops sagax*)
Kelp greenling (*Hexagrammos decagrammus*)	Longspine thornyhead (*Sebastolobus altivelis*)	Yelloweye rockfish (*S. ruberrimus*)	Pacific mackerel (*Scomber japonicus*)
Pacific cod (*Gadus macrocephalus*)	Shortspine thornyhead (*Sebastolobus alascanus*)	Yellowmouth rockfish (*S. reedi*)	Jack mackerel (*Trachurus symmetricus*)
Pacific whiting (Hake) (*Merluccius productus*)	Pacific Ocean perch (*S. alutus*)	Yellowtail rockfish (*S. flavidus*)	Market squid (*Loligo opalescens*)
Sablefish (*Anoplopoma fimbria*)	Quillback rockfish (*S. maliger*)	Arrowtooth flounder (*Atheresthes stomias*)	
Aurora rockfish (*Sebastes aurora*)	Redbanded rockfish (*S. babcocki*)	Butter sole (*Isopsetta isolepsis*)	**Salmon**
Bank Rockfish (*S. rufus*)	Redstripe rockfish (*S. proriger*)	Curlfin sole (*Pleuronichthys decurrens*)	Coho salmon (*O. kisutch*)
Black rockfish (*S. melanops*)	Rosethorn rockfish (*S . helvomaculatus*)	Dover sole (*Microstomus pacificus*)	Chinook salmon (*O. tshawytscha*)
Blackgill rockfish (*S. melanostomus*)	Rosy rockfish (*S. rosaceus*)	English sole (*Parophrys vetulus*)	

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